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AN5601K

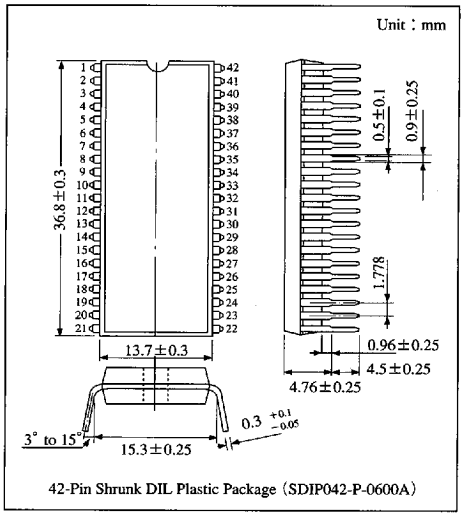
Color Signal, Video Signal and Synchronous Signal Processing IC for PAL/NTSC TV

■ Overview

The AN5601K is a single chip integrated circuit in which color signal processing, video signal processing and synchronous signal processing circuits for PAL/NTSC color TV are integrated.

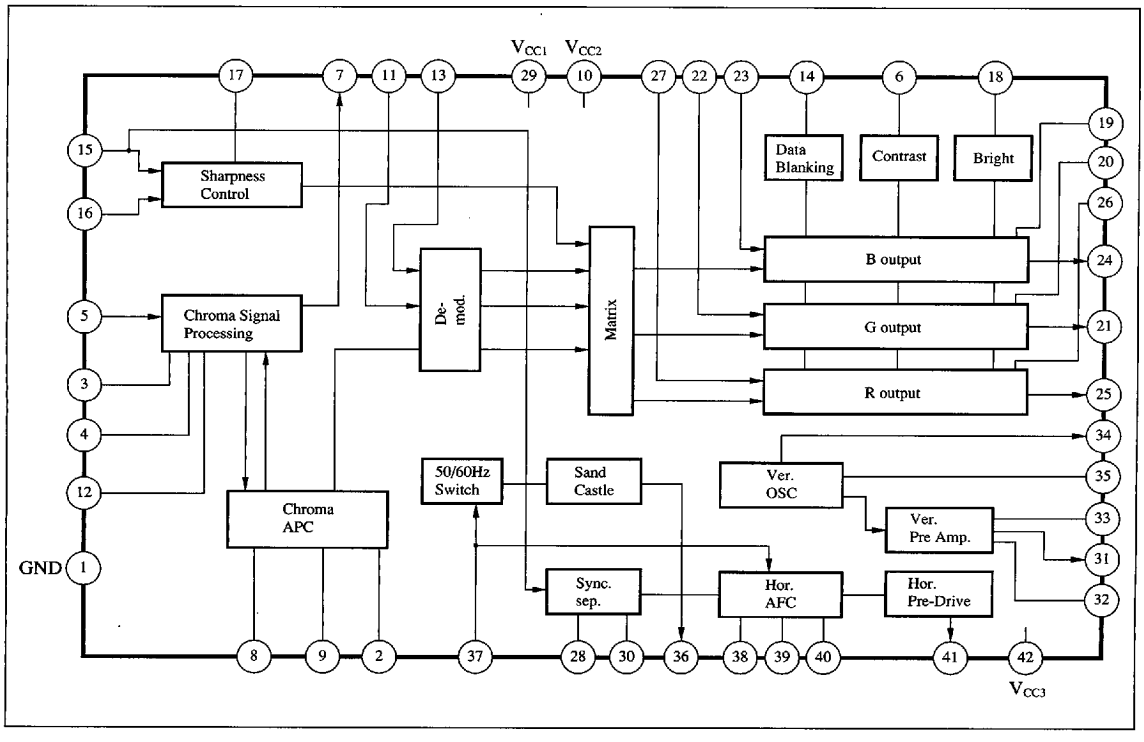
■ Features

- PAL/NTSC signal processing
- External RGB signal intput pin provided
- Compatible with the world set in combination with SECAM signal processing IC (AN5633K).
- Vertical 50/60Hz switching
- Dual loop horizontal AFC
- Sand-castle pulse output pin provided.



42-Pin Shrunk DIL Plastic Package (SDIP042-P-0600A)

■ Block Diagram



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■ Absolute Maximum Ratings (Ta=25℃)

Parameter	Symbol	Rating			Unit
Supply voltage	V_{CC}	V_{CC1}=13.8	V_{CC2}=6	V_{CC}=9.5	V
Power dissipation	P_D	1200 *			mW
Operating ambient temperature	T_{opr}	−20 to +70			℃
Storage temperature	T_{stg}	−55 to +150			℃

* Value at Ta=70℃ and mounted on board.

■ Recommended Operating Range (Ta=25℃)

Parameter	Symbol	Range
Operating supply voltage range	V_{CC1}	9.6V to 13.8V
	V_{CC2}	4V to 6V

■ Electrical Characteristics (Ta=25℃)

Parameter	Symbol	Condition	min	typ	max	Unit
Circuit current	I_{CC1}	V_{CC1}=12V typ, V_{CC2}=5V	47	66	80	mA
Circuit current	I_{CC2}	V_{CC2}=5V typ, V_{CC1}=12V	8	12	15.5	mA
Circuit current	I_{CC3}	V_{CC1}=12V, V_{CC2}=5V, Pin㊷=8.6V	9.5	13.5	17.5	mA
Pin② voltage	V_{2-1}	V_{CC1}=12V, V_{CC2}=5V	2.05	2.6	3.15	V
Pin⑤ voltage	V_{5-1}	V_{CC1}=12V, V_{CC2}=5V	2.15	2.7	3.25	V
Pin⑪ voltage	$V_{11-1(PAL)}$	V_{CC1}=12V, V_{CC2}=5V (PAL Mode)	2.75	3.3	3.85	V
Pin⑬ voltage	$V_{13-1(PAL)}$	V_{CC1}=12V, V_{CC2}=5V (PAL Mode)	2.75	3.3	3.85	V
Pin⑪ voltage	$V_{11-1(NTSC)}$	V_{CC1}=12V, V_{CC2}=5V (NTSC Mode)	1.55	2.1	2.65	V
Pin⑬ voltage	$V_{13-1(NTSC)}$	V_{CC1}=12V, V_{CC2}=5V (NTSC Mode)	1.55	2.1	2.65	V
Chroma System						
ACC characteristics	A_{CC}	Color bar input signal Burst 150mV_{PP} −20dB Demodulated output	0.65	0.8	1.12	Times
Demodulated color difference 1	e_{O1}	Color bar input Color : max., Contrast : max.	6	7	—	V_{O-P}
Demodulated color difference ratio R/B	R/B	Rainbow input	0.72	0.83	0.9	Times
Demodulated color difference ratio G/B	G/B	Rainbow input	0.31	0.37	0.42	Times
Color killer tolerance (PAL)	$e_{K(PAL)}$	Color bar input burst 150mV_{P-P}=0dB Pin⑫ -V_{CC1} 1.8MΩ connected (PAL)	29	34	39	dB
Color killer tolerance (NTSC)	$e_{K(NTSC)}$	Color bar input burst 150mV_{P-P}=0dB Pin⑫ -V_{CC1} 1.8MΩ connected (NTSC)	31	36	41	dB
fo dependent degree to supply voltage	Δf_{OV}	V_{CC1}=13.8 to 9.6V	—	±60	±120	Hz
Tint variable range	$\Delta\theta$	Tint control voltage, max. to min.	±35	±45	±55	deg
Video Output System						
Video signal output 1	Av_1	Input stair step, 350mV_{O-P} Cont : max.	5	5.7	6.4	V_{O-P}
Picture quality variable range	Δf_{VP}	Sine wave input, f=2.5MHz	13.5	17	20	dB
DC regeneration rate	T_{DC}	Input stair step, APL 10 to 90% variable	91	95	—	%
Data blanking level	Data BLK SW	Voltage when output ON/OFF according to the data of BLK-voltage-variation	0.35	—	0.85	V

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■ Electrical Characteristics (cont.) (Ta=25℃)

Parameter	Symbol	Condition		min	typ	max	Unit
Deflection System							
Vertical oscillation start voltage	V_{fV}	Voltage of Pin㉙		—	—	6.2	V
Vertical pulse width	W_{PV}	Pin㉝ C.Ropen (PAL)		500	600	820	μs
Horzontal oscillation start voltage	V_{fH}	Pin㊷ voltage measurement		—	5.8	6.2	V
Horizontal oscillation frequency supply voltage dependency	$\Delta f_{HO(V)}$	V_{CC3}=6.7 to 8.5V		—	60	100	Hz
Horizontal oscillation frequency oscillator sensitivity	β_{HOSC}	I_O=100μA		18.5	21	23.5	Hz/μA
50Hz/60Hz Switching level (50Hz)	$V_{50/60(1)}$	Pin㊲ input 50Hz 3V 60Hz 7V		2.5	3	3.5	V
50Hz/60Hz Switching level (60Hz)	$V_{50/60(2)}$			6.5	7	7.5	V
Sand castle pulse burst gate width	WP(Burst)	Output waveform of Pin㊱ Burst gate width measurement	PAL	3.8	4	4.2	μs
			NTSC	2.8	3	3.2	
Sand castle pulse V blanking width	WP(VBLK)	Output waveform of Pin㊱ VBLK width measurement	50Hz	1.28	1.34	1.4	ms
			60Hz	1.02	1.08	1.14	

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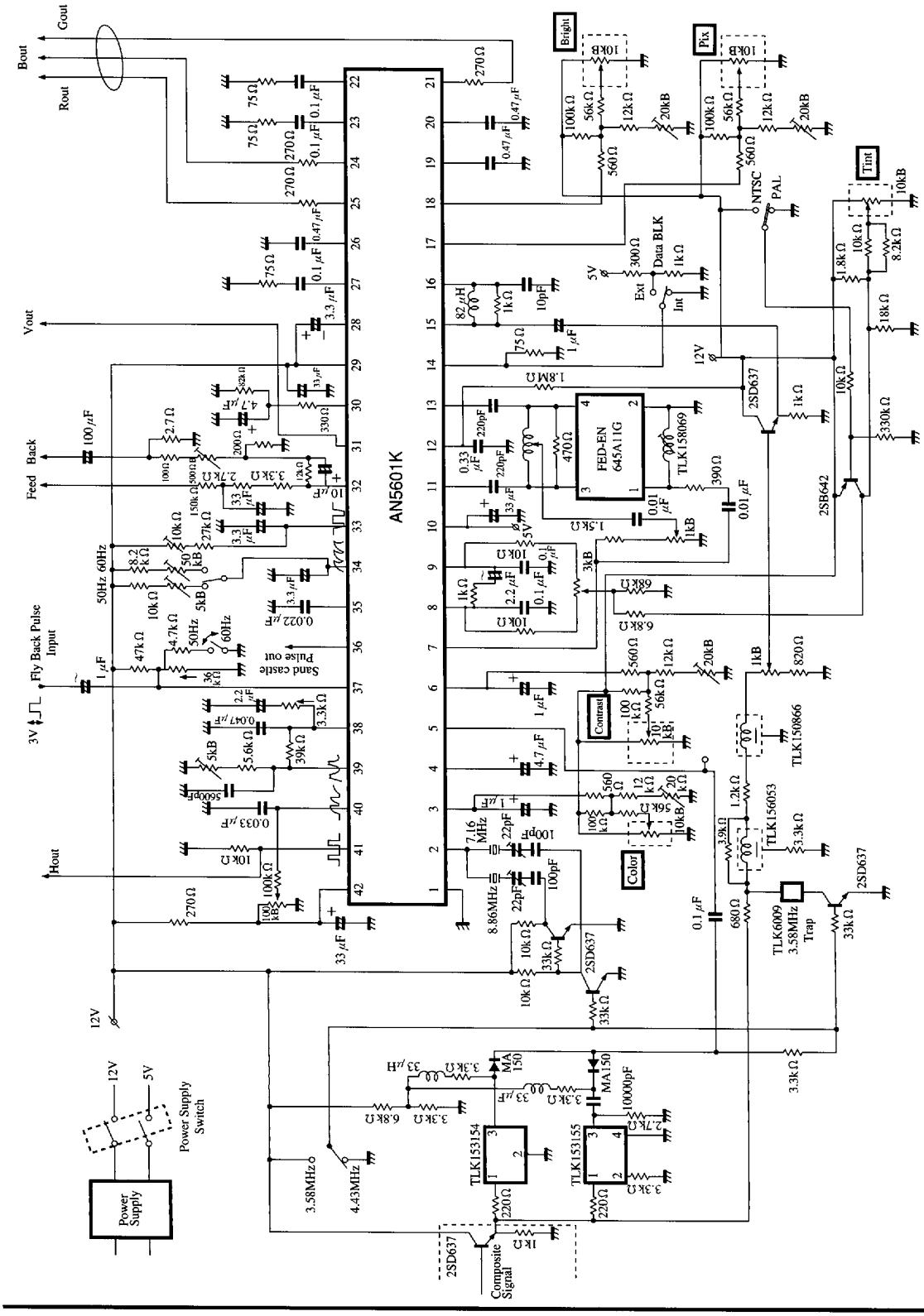
Application Circuit



ICs for TV

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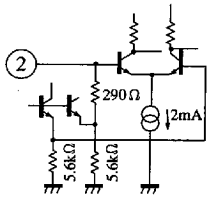
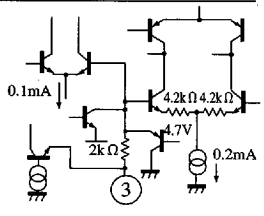
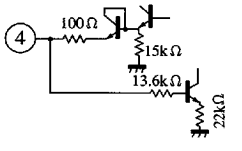
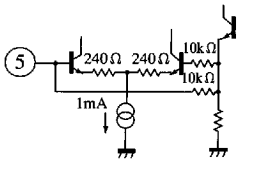
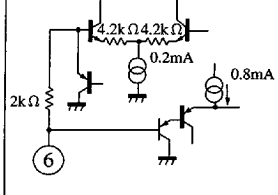
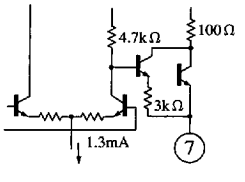
■ Pin Descriptions

Pin No.	Pin name	Description	Typ. waveform	Equivalent circuit
1	GND	GND	———	———
2	Chroma VCO Oscillation output	VCO X'tal connection	8.86MHz (PAL) 7.16MHz (NTSC) Oscillation output 0.25V_{PP} 2.7V_{DC}	
3	Color control	Control the color difference amplitude by changing the pin voltage from 0 to 5V.	———	
4	ACC filter	ACC amp controlling filter.	5.1V_{DC}	
5	Chroma signal input	Chroma signal input	Standard input (When color bar is input) Signal : 330mV, Burst : 150mV	
6	Contrast control	Control the output amplitude by changing the pin voltage from 1 to 5V. Forcible blanking is activated at pin voltage of 1V or less.	———	
7	Chroma signal output	ACC amp output.	(When color bar is input) Burst level : 800mV_{PP} 8V_{DC} 8V	

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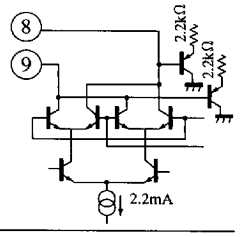
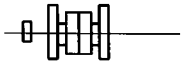
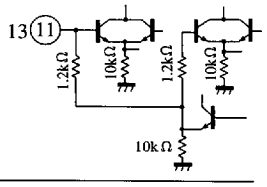
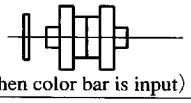
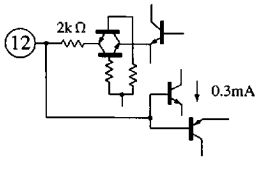
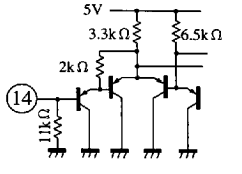
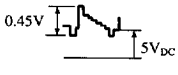
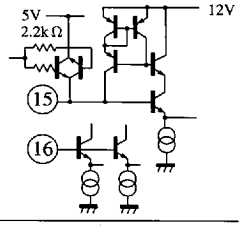
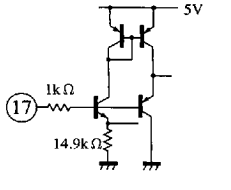
■ Pin Descriptions (cont.)

Pin No.	Pin name	Description	Typ. waveform	Equivalent circuit
8	Phase detection 1	APC PAL/NTSC switching Tint control in case of NTSC	9.6V_{DC} or more : PAL 9.4V_{DC} or less : NTSC	
9	Phase detection 2			
10	Supply voltage (5V)	Apply supply voltage of 5V	———	———
11	R−Y input	R−Y component input.	 Burst level : 100mV_{PP} 3.3V_{DC} (PAL)	
13	B−Y input	B−Y component input	 (When color bar is input)	
12	Color killer filter	Color killer amp control filter.	———	
14	Data blanking	Switch the internal TV signal and external RGB signal.	Hi : External RGB signal Lo : Internal TV signal	
15	Video signal input 1	Video signal input	Standard input : 450mV_{PP} Signal component : 315mV_{PP} Sync component : 135mV_{PP} Max. input : 900mV_{PP} 	
16	Video signal input 2			
17	Picture control	Control the picture quality by changing the pin voltage from 0 to 5V.	———	

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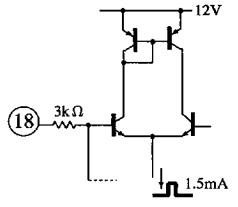
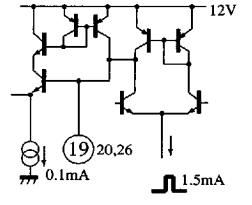
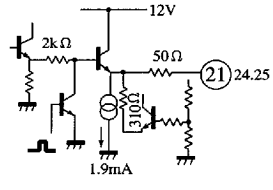
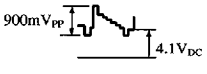
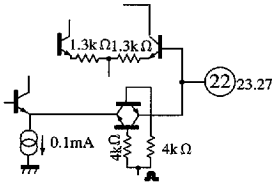
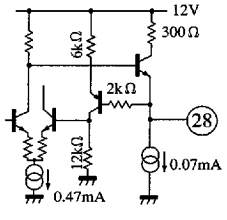
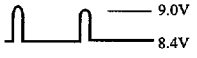
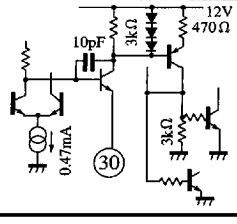
■ Pin Descriptions (cont.)

Pin No.	Pin name	Description	Typ. waveform	Equivalent circuit
18	Brightness control	Control the pedestal level of output by changing the pin voltage from 0 to 5V.	———	
19 20 26	Output clamp (B) Output clamp (G) Output clamp (R)	Connect the output clamp capacitor.	$10.3V_{DC}$ (When $V_{CC1}=12V$)	
21 24 25	Original color (G) Original color (B) Original color (R)	R.G.B original color.	Original color : max.$10.4V_{PP}$	
22 23 27	External signal (G) External signal (B) External signal (R)	External R.G.B signal input.	Standard input : $900mV_{PP}$ 	
28	Synchronous Separation clamp Noise canceller	Bias output-pin for supplying the comparison voltage to noise canceller circuit of the synchronous signal separation.	DC 9V	
29	Supply voltage (12V) V_{CC1}	Supply voltage pin.	DC 12V	———
30	Synchronous Separation filter	Pin for cutting a video-signal for synchronous separation and determining the sampling level of a synchronous signal.		

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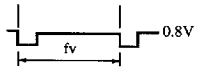
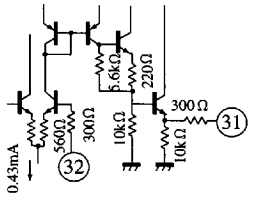
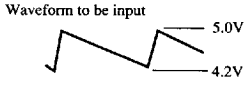
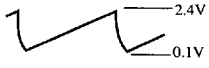
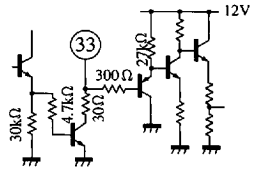
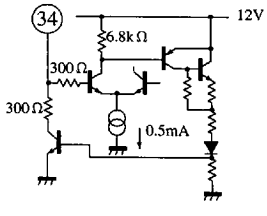
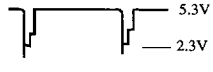
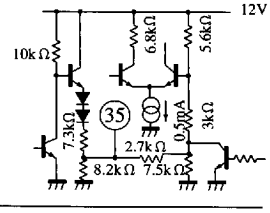
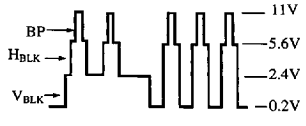
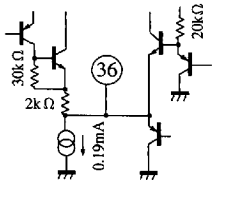
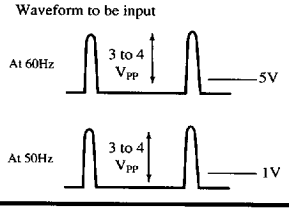
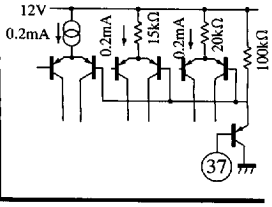
Pin Descriptions (cont.)

Pin No.	Pin name	Description	Typ. waveform	Equivalent circuit
31	Vertical output V_{OUT}	Vertical drive output pin.		
32	Feedback input	Output feedback pin for compensating the linearity of vertical output, and for improving response.		
33	Vertical oscillation	Perform 45 to 60Hz vertical oscillation.		
34	Vertical hold	Pin for generating sawtooth-wave voltage for vertical drive.		
35	Vertical integration	Low pass filter pin for performing the vertical synchronous separation and pulling-in vertical oscillation.		
36	Sand castle Pulse output	Superimpose V_{BLK}, H_{BLK} and BP pulses for output. BP = 3 μs · 4 μs H_{BLK} = 11 to 12 μs V_{BLK} = 1100 μs · 1350 μs		
37	50Hz/60Hz Switching Flyback Pulse input	Use as a pin for FB-pulse-input and pin for V_{BLK}-pulse-width-switching at 50Hz and 60Hz.		

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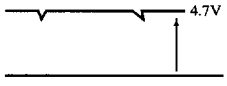
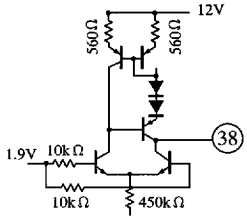
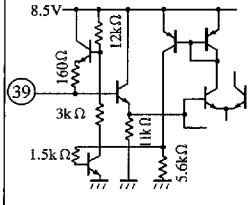
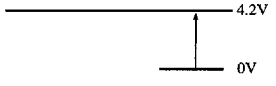
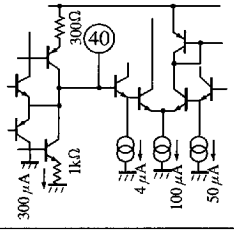
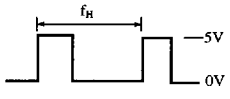
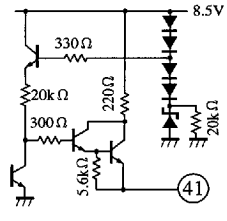
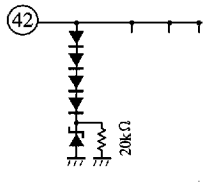
■ Pin Descriptions (cont.)

Pin No.	Pin name	Description	Typ. waveform	Equivalent circuit
38	Horizontal AFC output	AFC-current push-pull pin.		
39	Horizontal oscillation	Perform 30 to 32kHz horizontal oscillation (double f_H oscillation).		
40	Horizontal center adjustment	DC level-adjusting-pin for adjusting the screen position in a horizontal direction.		
41	Horizontal output	Horizontal drive output pin.		
42	Horizontal supply voltage V_{CC3}	The horizontal supply voltage pin by built-in zenerdiode. I_{CC3} requires about 12mA.	DC8.6V	

■ Supplementary Explanation

• Design Reference Value of Electrical Characteristics (Ta=25℃)

Parameter	Symbol	Condition	min	typ	max	Unit
Chroma System						
fo Change with ambient temperature	Δf_{OT}	V_{CC1}=12V, V_{CC2}=5V	—	−2	—	Hz/℃
Demodulation angle (Color difference) ∠R	∠R	Based on ∠B	86.5	90	93.5	deg
Demodulation angle (Color difference) ∠G	∠G	Based on ∠G	229	236	244	deg
APC pull-in range (1)	$f_{P\,(PAL)}$	PAL Mode 4.43MHz	500	700	—	Hz
APC pull-in range (2)	$f_{P\,(NTSC)}$	NTSC Mode 3.58MHz	500	700	—	Hz

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• Design Reference Value of Electrical Characteristics (cont.) (Ta=25℃)

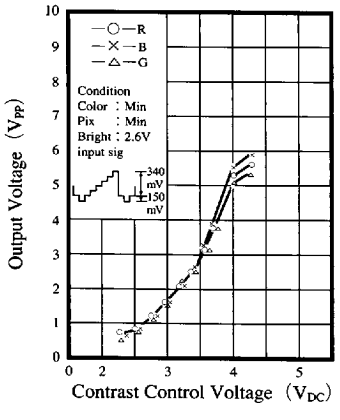
Parameter	Symbol	Condition	min	typ	max	Unit
Video Output System						
Bright control sensitivity	S_{BR}	Δ (Output DC) /Δ (Bright voltage)	1.7	1.9	2.1	—
Video frequency characteristics	f_v	Pix typ-3dB point	6	—	—	MHz
RGB external input signal internal RGB signal crosstalk	CT INT-EXT	Crosstalk when data blanking is switched	46	—	—	dB
Data switching time	td	V_{CC1}=12V, V_{CC2}=5V	—	—	20	ns
PAL/NTSC switching level	$V_{SPAL/NTSC}$	PAL/NTSC demodulation when PAL signal input and R-Y output	8.8	9.2	9.7	V
Deflection System						
Vertical oscillation frequency ambient temperature dependency	$\Delta f_{VO-(T)}$	−20 to +70℃ temperture change V_{CC1}=12V V_{CC2}=5V	−220	−170	0	ppm/℃
Horizontal oscillation frequency ambient temperature dependency	$\Delta f_{HO-(T)}$	−20 to +70℃ temperture change V_{CC1}=12V V_{CC2}=5V	−210	−100	0	ppm/℃
Sand castle pulse level (V)	V_{SC-V}	V_{CC1}=12V, V_{CC2}=5V, Pin㊱ output	1.8	2.3	2.8	V
Sand castle pulse level (H)	V_{SC-H}	V_{CC1}=12V, V_{CC2}=5V, Pin㊱ output	4.8	5.3	5.8	V
Sand castle pulse level (Burst gate)	V_{SC-Bur}	V_{CC1}=12V, V_{CC2}=5V, Pin㊱ output	10.5	11	11.5	V

Note) The value in the above characteristics is not a guaranteed value, but reference one on design.

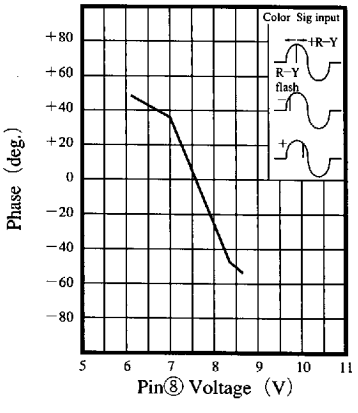
ICs for TV

• Characteristic Curve

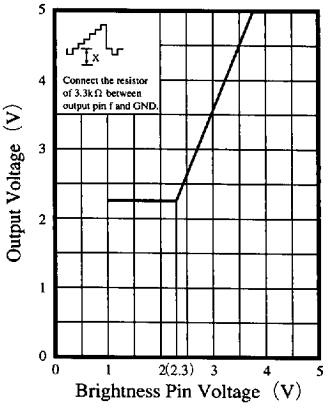
Contrast Control Characteristics



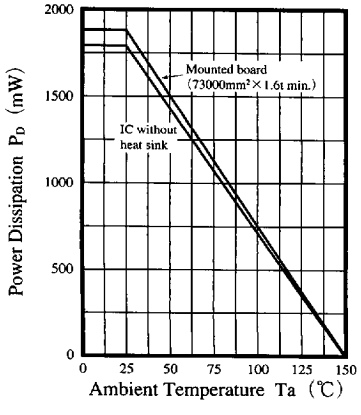
Tint Variable Range



Brightness Control Characteristics



P_D–Ta Characteristics



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